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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/532,554	07/25/2005	Christian Bock	3000-0008	5774

50811 7590 05/28/2008
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EXAMINER	
FLORES, LEON	
ART UNIT	**PAPER NUMBER**
2611	
MAIL DATE	**DELIVERY MODE**
05/28/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/532,554	BOCK ET AL.	
	Examiner	Art Unit	
	LEON FLORES	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 September 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13 and 16-20* is/are rejected.

7)☒ Claim(s) *14 and 15* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 September 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. **Claims (1-2, 4-13, 16-20) are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoffman. (US Patent 4,843,616)**

Re claim 1, Hoffman discloses a method of generating an auxiliary symbol when a digital signal locked to a quadrature signal pair is received, the method comprising the steps of: determining nominal radii and range limits according to predetermined positions of the digital signal in a plane determined by the quadrature signal pair (See fig. 2 & col. 7, lines 36-46); determining a preliminary symbol from the digital signal by

sampling the digital signal as controlled by a symbol sampling clock (See fig. 2: R & col. 6, lines 56-58 & col. 7, line 67 - col. 8, line 7); determining polar coordinates of the preliminary symbol (See fig. 2: R & col. 6, lines 56-58 & col. 7, line 67 - col. 8, line 7); and determining a nominal radius from the polar coordinates of the preliminary symbol according to the range limits (See fig. 2, col. 6, lines 44-63 & col. 7, lines 48-54).

But the reference of Hoffman fails to explicitly teach where the determined nominal radius and an angle component define polar coordinates of the auxiliary symbol in the plane of the quadrature signal pair.

However, the reference of Hoffman does suggest (See col. 7, line 67 – col. 8, line 8) where the determined nominal radius ("R6 – 7.343" It is determined that this is the closes radius to the received symbol) and an angle (α = 45 if one takes into consideration the real angle of the received signal or α = 59.45 if one takes into the account that the auxiliary symbol has the same angle as the received symbol) component define polar coordinates of the auxiliary symbol in the plane of the quadrature signal pair.

Therefore, it would have been obvious to one of ordinary skills in the art to incorporate this feature into the system of Hoffman, in the manner as claimed, for the benefit of detecting the most probable region.

Re claim 2, the reference of Hoffman fails to explicitly teach converting the polar coordinates of the auxiliary symbol into a Cartesian coordinate system determined by the quadrature signal pair.

The reference of Hoffman does suggest (See col. 7, line 67 – col. 8, line 8) determining the closes radius and angle from the received symbol by using two thresholds. Furthermore, one skilled in the art would know that converting from cartesian to polar, and vice versa, is notoriously well known in the art.

Therefore, it would have been obvious to one of ordinary skills in the art to incorporate this feature into the system of Hoffman, in the manner as claimed, for the benefit of detecting the most probable region.

Re claim 4, the reference of Hoffman fails to explicitly teach that where the step of determining a nominal radius from the polar coordinates determines the nominal radius from a radius component of the preliminary symbol.

However, the reference of Hoffman does suggest (See col. 7, line 67 – col. 8, line 8) where the step of determining a nominal radius from the polar coordinates determines the nominal radius from a radius component of the preliminary symbol.

Therefore, it would have been obvious to one of ordinary skills in the art to incorporate this feature into the system of Hoffman, in the manner as claimed, for the benefit of detecting the most probable region.

Re claim 5, the reference of Hoffman fails to explicitly teach that the step of determining quadrature components of the auxiliary symbol from the determined nominal radius and the angle component.

However, the reference of Hoffman does suggest (See col. 7, line 67 – col. 8, line

8) the step of determining quadrature components of the auxiliary symbol from the determined nominal radius and the angle component. One skilled in the art would know that each of these points lie in the IQ plane. Furthermore, the examiner does not see the advantage of generating an auxiliary symbol in order to decide which of the symbols (points in the constellation) was transmitted.

Therefore, it would have been obvious to one of ordinary skills in the art to incorporate this feature into the system of Hoffman, in the manner as claimed, for the benefit of detecting the most probable region.

Re claim 6, Hoffman further discloses that wherein the determined nominal radii comprise radii on which predetermined symbols of the alphabet lie in the plane determined by the quadrature signal pair. (See fig. 2 & col. 7, lines 36-46)

Re claim 7, Hoffman further discloses that, where at least one of the range limits is defined by a radius limit. (See fig. 2 & col. 7, lines 36-46)

Re claim 8, Hoffman further discloses that where at least one of the radius limits lies between adjacent ones of the nominal radii. (See fig. 2 & col. 7, lines 36-46)

Re claim 9, Hoffman further discloses that where the step of determining nominal radii and range limits determines the range limits by defining limit radii that may comprise radii of a predetermined modulation standard. (See fig. 2 & col. 7, lines 36-46)

Re claim 10, Hoffman further discloses that where adjacent ones of the limit radii define an annulus that includes at least one of the nominal radii. (See fig. 2 & col. 7, lines 36-46)

Re claim 11, Hoffman further discloses a circuit for generating an auxiliary symbol from a preliminary symbol in a device for receiving a digital signal locked to a quadrature signal pair, comprising: a resolver that converts Cartesian quadrature signal components of the preliminary symbol into polar coordinates (See col. 5, line 60 – col. 6, line 11); and a radius decision stage that determines from the polar coordinates of the preliminary symbol the most probable nominal radius. (See col. 6, lines 24-68)

But the reference of Hoffman fails to explicitly teach that where the most probable nominal radius and an angle component of the preliminary symbol defines polar coordinates of the auxiliary symbol.

However, the reference of Hoffman does suggest (See col. 7, line 67 – col. 8, line 8) that where the most probable nominal radius ("R6 – 7.343" It is determined that this is the closes radius to the received symbol) and an angle component of the preliminary symbol defines polar coordinates of the auxiliary symbol. ($\alpha = 45$ if one takes into consideration the real angle of the received signal or $\alpha = 59.45$ if one takes into the account that the auxiliary symbol has the same angle as the received symbol)

Therefore, it would have been obvious to one of ordinary skills in the art to incorporate this feature into the system of Hoffman, in the manner as claimed, for the benefit of detecting the most probable region.

Re claim 12, the reference of Hoffman fails to disclose a second resolver that converts the polar coordinates of the auxiliary symbol to Cartesian coordinates in a plane determined by the quadrature signal pair.

However, the reference of Hoffman does suggest (See col. 7, line 67 – col. 8, line 8) determining the closes radius and angle from the received symbol by using two thresholds. Furthermore, one skilled in the art would know that converting from cartesian to polar, and vice versa, is notoriously well known in the art.

Therefore, it would have been obvious to one of ordinary skills in the art to incorporate this feature into the system of Hoffman, in the manner as claimed, for the benefit of detecting the most probable region.

Re claim 13, the reference of Hoffman fails to disclose that where at least one decision-feedback controller in the device utilizes the auxiliary symbol for control thereof.

However, the reference of Hoffman does teach using the phase difference of the actual and desired, as a control value, to control a voltage controlled oscillator. (See col. 8, lines 16-20)

Therefore, it would have been obvious to one of ordinary skills in the art to incorporate this feature into the system of Hoffman, in the manner as claimed, for the benefit of providing compensation at the receiver.

Re claim 16, the reference of Hoffman fails to disclose that where the device comprises a demodulator that is provided with the digital signal and determines and provides the decision symbols in response thereto.

However, the reference of Hoffman does teach a demodulator that is provided with the digital signal and determines and provides the decision symbols in response thereto. (See col. 1, lines 6-35)

Therefore, it would have been obvious to one of ordinary skills in the art to incorporate this feature into the system of Hoffman, in the manner as claimed, for the benefit of estimating the transmitted symbol.

Re claim 17, Hoffman discloses a method for adjusting at least one decision-feedback controller within a demodulator using an auxiliary symbol in place of a decision symbol, the method comprising the steps of: receiving a digital signal locked to a quadrature signal pair (See fig. 2 & col. 7, line 66 – col. 8, line 5); determining nominal radii and range limits according to predetermined positions of the digital signal in a plane determined by the quadrature signal pair (See col. 7, lines 36-46); determining a preliminary symbol from the digital signal. (See col. 7, line 66 - col. 8, line 5)

But the reference of Hoffman fails to disclose determining the auxiliary symbol from the preliminary symbol; and adjusting the at least one decision-feedback controller in dependence on the preliminary symbol.

However, the reference of Hoffman does suggest (See col. 7, line 67 – col. 8, line 8) determining the auxiliary symbol from the preliminary symbol ("R6 – 7.343" It is

determined that this is the closes radius to the received symbol, $\alpha = 45$ if one takes into consideration the real angle of the received signal or $\alpha = 59.45$ if one takes into the account that the auxiliary symbol has the same angle as the received symbol.); and adjusting the at least one decision-feedback controller in dependence on the preliminary symbol. (See col. 8, lines 16-20)

Therefore, it would have been obvious to one of ordinary skills in the art to incorporate this feature into the system of Hoffman, in the manner as claimed, for the benefit of detecting the most probable region and providing compensation.

Re claim 18, Hoffman further discloses that where the step of determining the auxiliary symbol from the preliminary symbol comprises the steps of: determining polar coordinates of the preliminary symbol (See fig. 2 & col. 7, line 67 – col. 8, line 8); determining a nominal radius from the polar coordinates of the preliminary symbol in accordance with the range limits, the determined nominal radius comprising one of the nominal radii. (See fig. 2 & col. 7, line 67 – col. 8, line 8)

But the reference of Hoffman fails to disclose determining the auxiliary symbol in terms of polar coordinates thereof, the polar coordinates of the determined auxiliary symbol comprising the determined nominal radius and an angle component of the preliminary symbol.

However, the reference of Hoffman does suggest (See col. 7, line 67 – col. 8, line 8) determining the auxiliary symbol in terms of polar coordinates thereof, the polar coordinates of the determined auxiliary symbol comprising the determined nominal

radius and an angle component of the preliminary symbol. ("R6 – 7.343" It is determined that this is the closes radius to the received symbol, α = 45 if one takes into consideration the real angle of the received signal or α = 59.45 if one takes into the account that the auxiliary symbol has the same angle as the received symbol.)

Therefore, it would have been obvious to one of ordinary skills in the art to incorporate this feature into the system of Hoffman, in the manner as claimed, for the benefit of detecting the most probable region.

Re claim 19, the reference of Hoffman fails to disclose that where after the step of determining the auxiliary symbol in terms of polar coordinates thereof, the method further comprises the step of determining quadrature components of the auxiliary symbol from the determined nominal radius and the angle component.

However, the reference of Hoffman does suggest (See col. 7, line 67 – col. 8, line 8) where after the step of determining the auxiliary symbol in terms of polar coordinates thereof, the method further comprises the step of determining quadrature components of the auxiliary symbol from the determined nominal radius and the angle component. One skilled in the art would know that each of these points lie in the IQ plane.

Therefore, it would have been obvious to one of ordinary skills in the art to incorporate this feature into the system of Hoffman, in the manner as claimed, for the benefit of detecting the most probable region.

Re claim 20, Hoffman further discloses that where the determined nominal radii comprise radii in which predetermined symbols of the alphabet lie in the plane determined by the quadrature signal pair. (See fig. 2 & col. 7, lines 36-46)

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hoffman. (US Patent 4,843,616), as applied to claim 1 above, and further in view of Applicant Admitted Prior Art. (hereinafter Prior Art)

Re claim 3, the reference of Hoffman fails to disclose that where the digital signal comprises a digitized signal and where the method further comprises the step of temporally interpolating the digitized signal as a function of a respective instant of the symbol sampling clock when a digitization clock and the symbol sampling clock are independent of each other.

However, Prior art does. (See page 20 in the specifications or paragraph 5 in the publication) Prior art discloses that where the digital signal comprises a digitized signal and where the method further comprises the step of temporally interpolating the digitized signal as a function of a respective instant of the symbol sampling clock when a digitization clock and the symbol sampling clock are independent of each other. ("temporal interpolation")

Therefore, taking the combined teachings of Hoffman and Prior art as a whole, it would have been obvious to one of ordinary skills in the art to incorporate this feature into the system of Hoffman, in the manner as claimed and as taught by Prior art, for the benefit of optimizing the QAM receiver.

5. **Claims (1, 11, 17) are rejected under 35 U.S.C. 103(a) as being unpatentable over Barabash et al. (hereinafter Barabash) (US Patent 5,640,417)**

Re claim 1, Barabash discloses a method of generating an auxiliary symbol when a digital signal locked to a quadrature signal pair is received, the method comprising the steps of: determining nominal radii and range limits according to predetermined positions of the digital signal in a plane determined by the quadrature signal pair (See col. 2, lines 31-45, fig. 2B & col. 6, lines 36-51); determining a preliminary symbol from the digital signal by sampling the digital signal as controlled by a symbol sampling clock (See col. 6, lines 59-65 “received signal sample”, figs 5 & 7 & col. 9, lines 13-25); determining polar coordinates of the preliminary symbol (See fig. 7: 62, 64 & col. 9, lines 13-25 “R & θ”); and determining a nominal radius from the polar coordinates of the preliminary symbol according to the range limits (See fig. 7: 72, 73a-c & col. 9, lines 26-53).

But the reference of Barabash fails to explicitly teach where the determined nominal radius and an angle component define polar coordinates of the auxiliary symbol in the plane of the quadrature signal pair.

However, the reference of Barabash does teach determining the most probable region where the received symbol should be. Furthermore, Barabash teaches that a threshold associated with each of the quadrature pair. And, if the received symbol lies within a specific region (specified by the threshold) we can safely conclude that the received symbol can be any of those predetermined symbols (points in the constellation).

Therefore, it would have been obvious to one of ordinary skills in the art to incorporate this feature into the system of Barabash, in the manner as claimed, for the benefit of detecting the most probable region.

Claim 11 has been analyzed and rejected w/r to claim 1 above.

Claim 17 has been analyzed and rejected w/r to claim 1 above.

Allowable Subject Matter

6. Claims (14-15) are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Greenberg (US Patent 5,519,356)
- Ahn (US Publication 2001/0017897 A1
- Sari (US Patent 4,958, 360)
- Belotserknovsky (US Publication 2005/0220220 A1)
- Herbig (US Patent 7,283,599 B1)

Contact

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LEON FLORES whose telephone number is (571)270-1201. The examiner can normally be reached on Mon-Fri 7-5pm Alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Payne can be reached on 571-272-3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/L. F./
Examiner, Art Unit 2611
April 29, 2008

/David C. Payne/

Supervisory Patent Examiner, Art Unit 2611